

AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims

1. - 9. (Canceled)

10. (New) A method of wave diagnostics of the oil-and-gas deposit which includes the excitation of the seismic waves by the near-surface sources of the oscillations, the recording of displacement vectors for the direct longitudinal and shear waves for the each observation point by means of the three-component seismic profiling along the depth of the investigated borehole and the processing of their kinematic and dynamical parameters, c h a r a c t e r i s e d in that

one near-surface source of the oscillations executes in the vicinity of the borehole the longitudinal wave excitation, and their reception is carried out simultaneously in the investigated and check boreholes;

after orientation in space of three-component observations data the monotype time signals for the compression and shear constituents of the direct longitudinal wave are extracted out of the seismic wavelets which were registered on the axial and tangential components of the displacement vector by the borehole and check devices respectively;

further by means of processing the kinematic parameters of the direct longitudinal and shear waves calculate interval values of longitudinal and shear modules of the elasticity;

after the decoding of the monotype time signals quantitative estimates of their significant dynamical parameters are defined for the borehole and check data, and respectively for the each observation point and constituent of the direct longitudinal wave, moreover the accuracy of the

Application No. 10/649,941
Art Unit: 3663
Attorney Docket No. 25585
Reply to Office Action mailed February 25, 2005

obtained estimates of the dynamical parameters is monitored by means of the computer modelling of the seismic signals;

then, carrying out the correction of the corresponding parameter because of the changes of the wave excitation conditions during multiple excitation of the oscillations and the filtration of the seismic signals in the covering thickness of the rocks, defines the dynamical parameters of the impulse responses, values of the coefficients of volumetric and shear dynamical viscosity and absorption for the compression and shear constituents of the layers, when the calibrated values of the absorption coefficients for the compression constituent are used in the capacity of the indicator for the presence estimates and the fluid-type identification, filling the pore and fissure volume in the rocks, and also values of the bedded coefficients of the effective attenuation, attenuation and energy dispersion of longitudinal wave are calculated;

then the obtained petrophysical data are converted into bedded values of the parameters of the reservoir and fluid-saturated properties of the layers with the aim of the necessary totality receipt of significant oil-field parameters for the identification of the oil-and-gas deposit image.

11. (New) The method according to claim 10 is characterized in that the check borehole is located on the trajectory of propagation direct longitudinal or shear wave between investigated borehole and the oscillations excitation point at distance 20 - 50 m from the last.

12. (New) The method according to claim 10 is characterized in that location depth of the explosive charge or air gun used for the oscillations excitation in the near-surface borehole is

Application No. 10/649,941
Art Unit: 3663
Attorney Docket No. 25585
Reply to Office Action mailed February 25, 2005

defined out of the separation condition of the direct longitudinal wave from the satellite waves, which are formed in the time of reflection of last from free earth surface.

13. (New) The method according to claim 11 is characterized in that the recording of the displacement vectors of the direct longitudinal or shear wave are carried out simultaneously in the investigated and check boreholes, moreover in the investigated borehole with the help of the three-component multi-level borehole sonde sequentially moving along borehole depth, and in the check borehole by means of stationary located three-component one-level sonde.

14. (New) The method according to claim 13 is characterized in that the detailed three-component profiling in the investigated borehole is executed with the step of the discrete observations every 2.5 - 5 m.

15. (New) The method according to claim 10 is characterized in that the monotype time signals extraction for the compression and shear constituents out of the observed experimentally seismic wavelets on the axial and tangential components of the displacements vector for the direct longitudinal wave is realized - for the compression constituent by means of deduction the seismic wavelets, observed on the axial component, with weight coefficient out of the seismic wavelets, observed on the axial component, whereas for receipt of the shear constituent - seismic wavelets, observed on the tangential component, are normalized with the same weight coefficient for each observation point in the investigated and check boreholes.

16. (New) The method according to claim 10 is characterized in that the interval values calculation of longitudinal and shear modules of the elasticity is made by means of the coprocessing of longitudinal and shear waves velocities and the density logging data.

17. (New) The method according to claim 10 is characterized in that decoding is realized by means of the parametrical analysis of the monotype time signals for the compression and shear constituents of the direct longitudinal wave with receipt of the quantitative estimates of their significant dynamical parameters for the borehole and check data.

18. (New) The method according to claim 17 is characterized in that in quality of the significant dynamical parameters of the monotype time signals for the compression and shear constituents of the direct longitudinal wave makes use of the initial amplitudes, steepness exponents, attenuation coefficients, instantaneous frequencies and initial phases.

19. (New) The method according to claim 10 is characterized in that with the purpose of the receipt of dynamical parameters of the layers impulse responses for given observation point executes numerical correction of the dynamical parameters estimates of the monotype time signals for borehole observations by means of the utilization of the analogous parameters of signals for the check observations, and further by means of the layer-stripping method is realized the correction of revised estimates of the dynamical parameters for the given observation point by means of use the analogous parameters of the monotype time signals for the previous observation point of lengthways depth of the borehole.

20. (New) The method according to claim 10 is characterized in that for qualitative indication of the presence and fluid type - oil, gas or water, filling the pore and fissured volume in the rocks, quantitative values of the bedded absorption coefficients for the compression constituent of the direct longitudinal wave are compared with the calibrated values of the above-mentioned coefficients for the oil-gas-or water-saturated rocks.

21. (New) The method according to claim 10 is characterized in that the calculation of bedded coefficients of the effective attenuation is realized by means of statistical processing of the interval values of the initial amplitudes previously corrected owing to the conditions change in the time of multiple excitation of the oscillations, and owing to the geometrical divergence of the wavefront, further is defined the bedded attenuation coefficients by means of the statistical processing of the interval values of the longitudinal modules of the elasticity, and also is defined bedded absorption coefficients, for that the absorption data average out statistically on depths intervals of the layers, respectively for the compression and shear constituents of the direct longitudinal wave.

22. (New) The method according to claim 10 is characterized in that the calculation of the oil-field parameters collection of the reservoir, such as bedded values of the coefficients of porosity, granular and fissured permeabilities, residual water saturation and fluid saturation are used bedded values of the coefficients of volumetric and shear dynamical viscosity jointly with values of the temperatures, diffusion constants, meanderingness of pore channels coefficients and others.